Meteorological Products Working Group Summary

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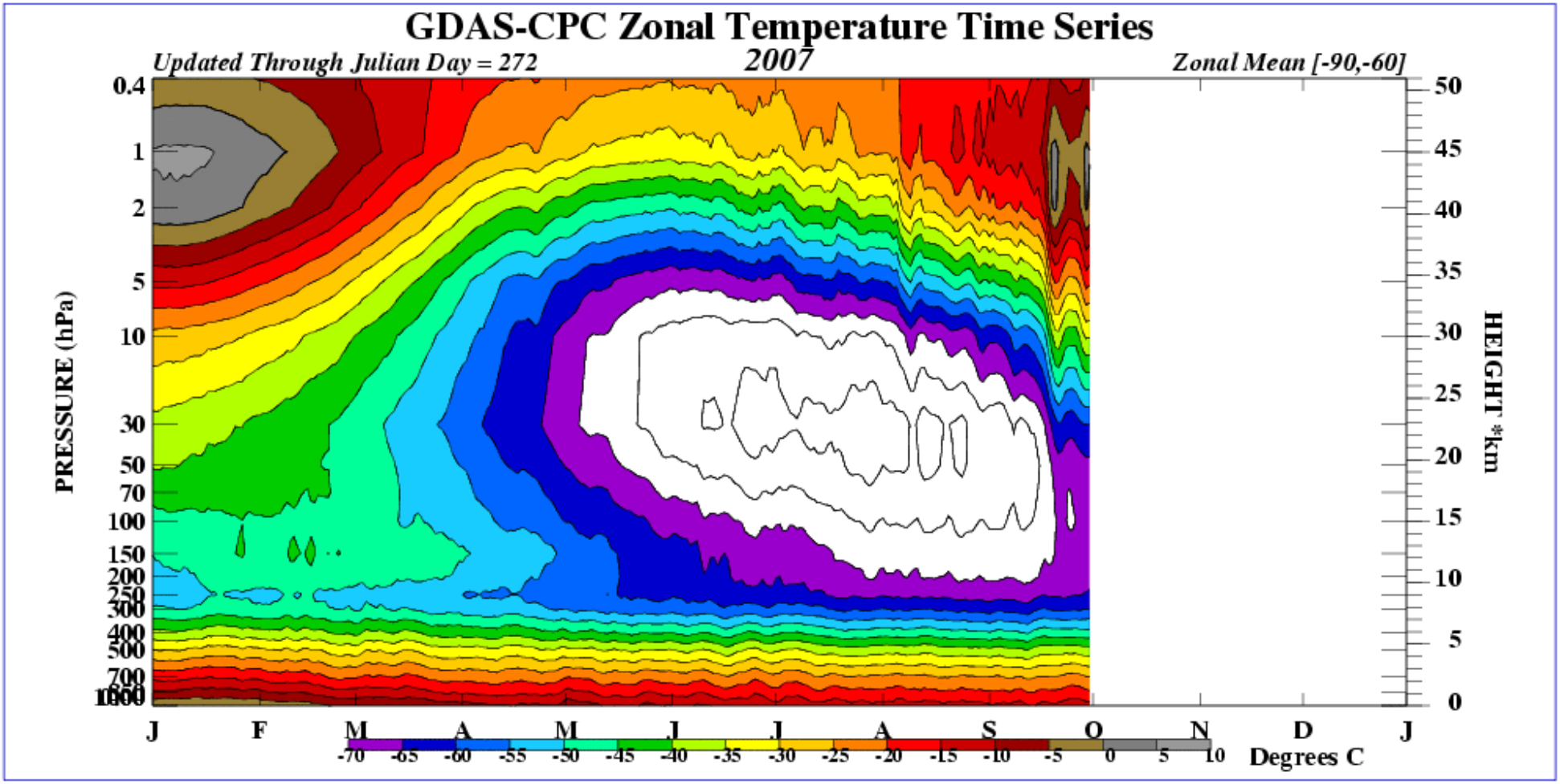
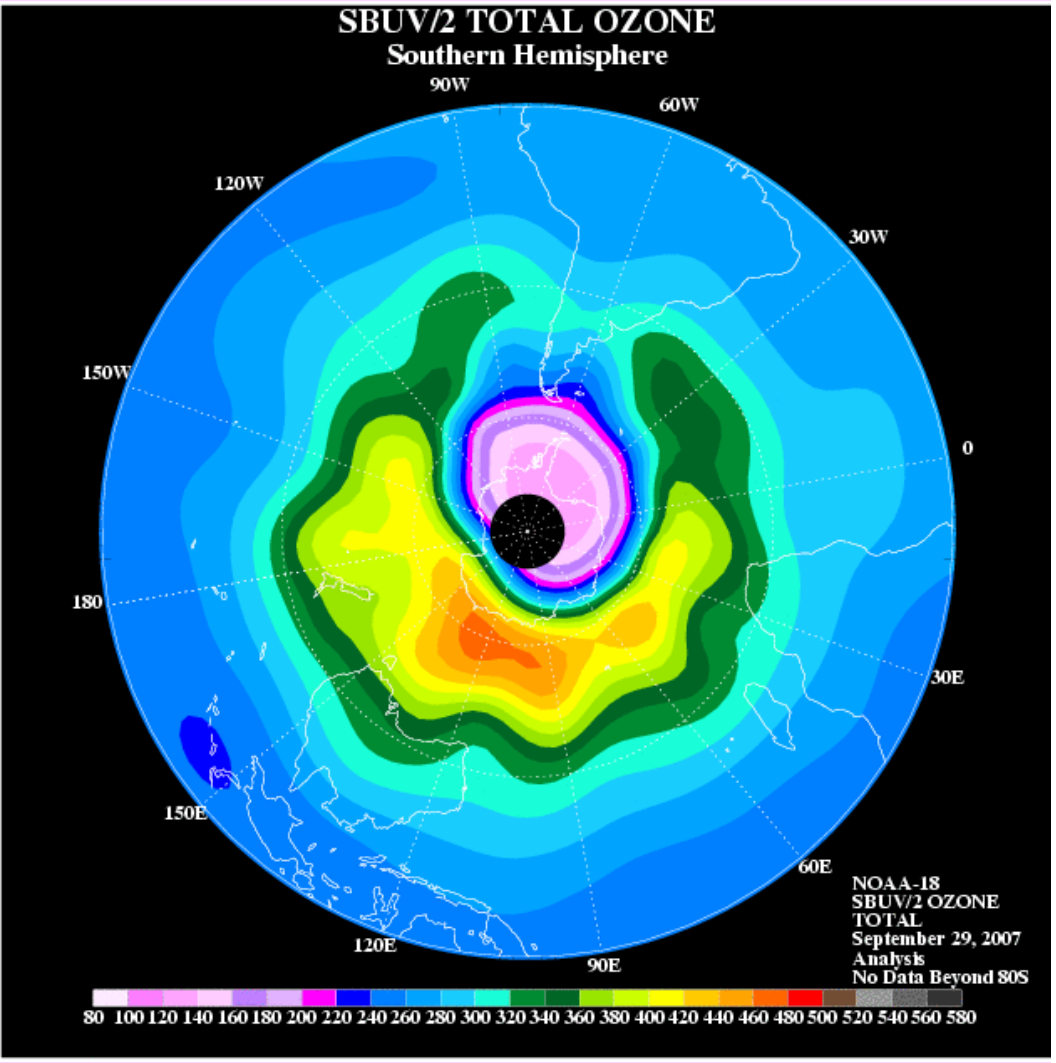
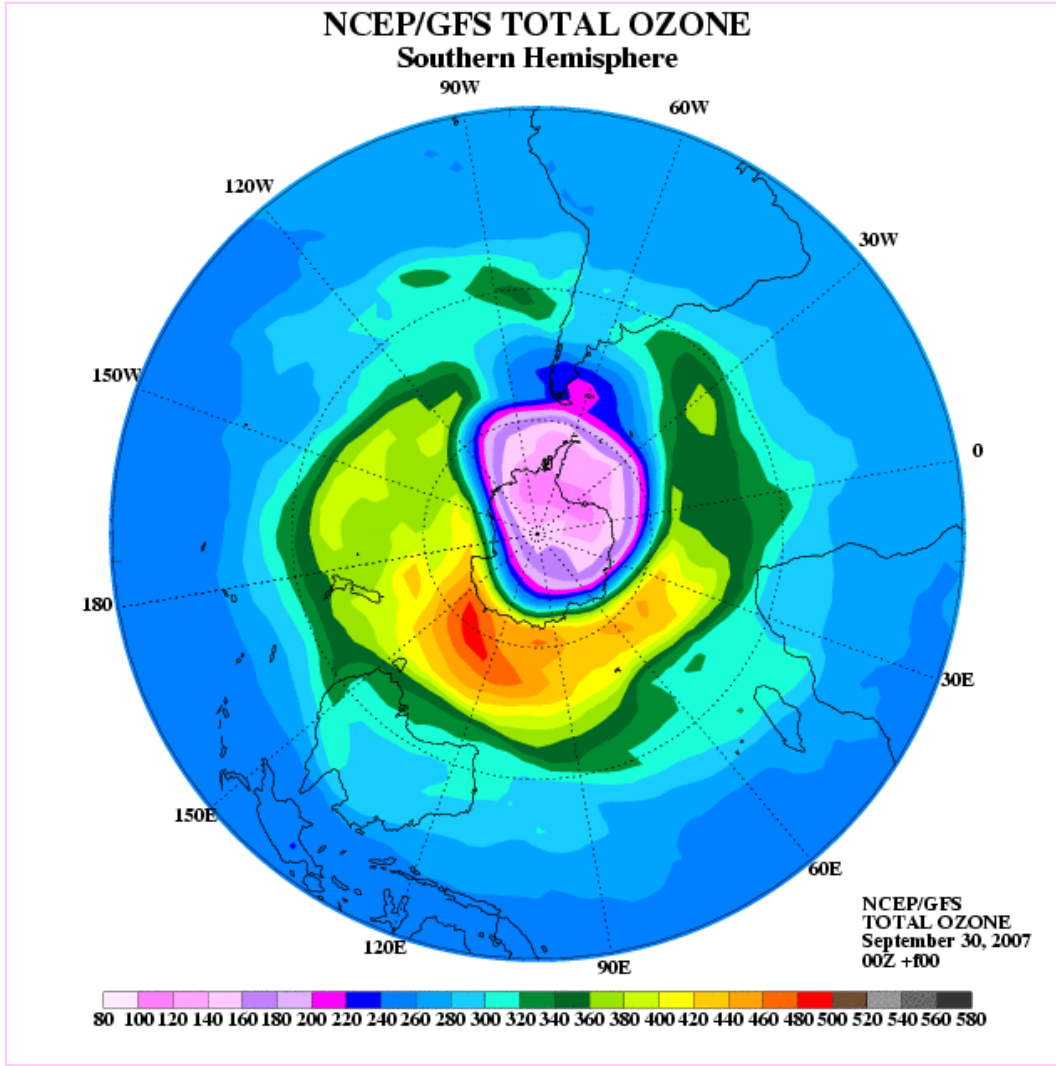
Craig Long: NOAA/NCEP (and Ozone Hole) Update

- Working toward "seamless suite of forecast products" (wide range of spatial/tempoaral scales, 0-24 h (e.g., severe weather) through approximately a year (e.g., ENSO)
- Recent changes (May 2007):
  - SSI to GSI (unifies global with mesoscale system; allows situation dependent background errors, assimilation and physics both done in hybrid sigma-pressure coordinate)
  - Vertical scheme from sigma to sigma-pressure hybrid (reduces vertical advection errors in upper part of model)
  - Inclusion of GPS (COSMIC) temperatures and water vapor
- Starting new reanalysis for 1979–present with current GFS model, expect available to public by mid-2009
- Year-long "reforecasts" 1979–present using lower horizontal resolution
- Current ozone research to operations: Includes SBUV/2, OMI total ozone; also to include NRT MLS (poster!), GOME-2, OMI profile, HIRDLS
- 2007 Ozone Hole Update (figures follow)

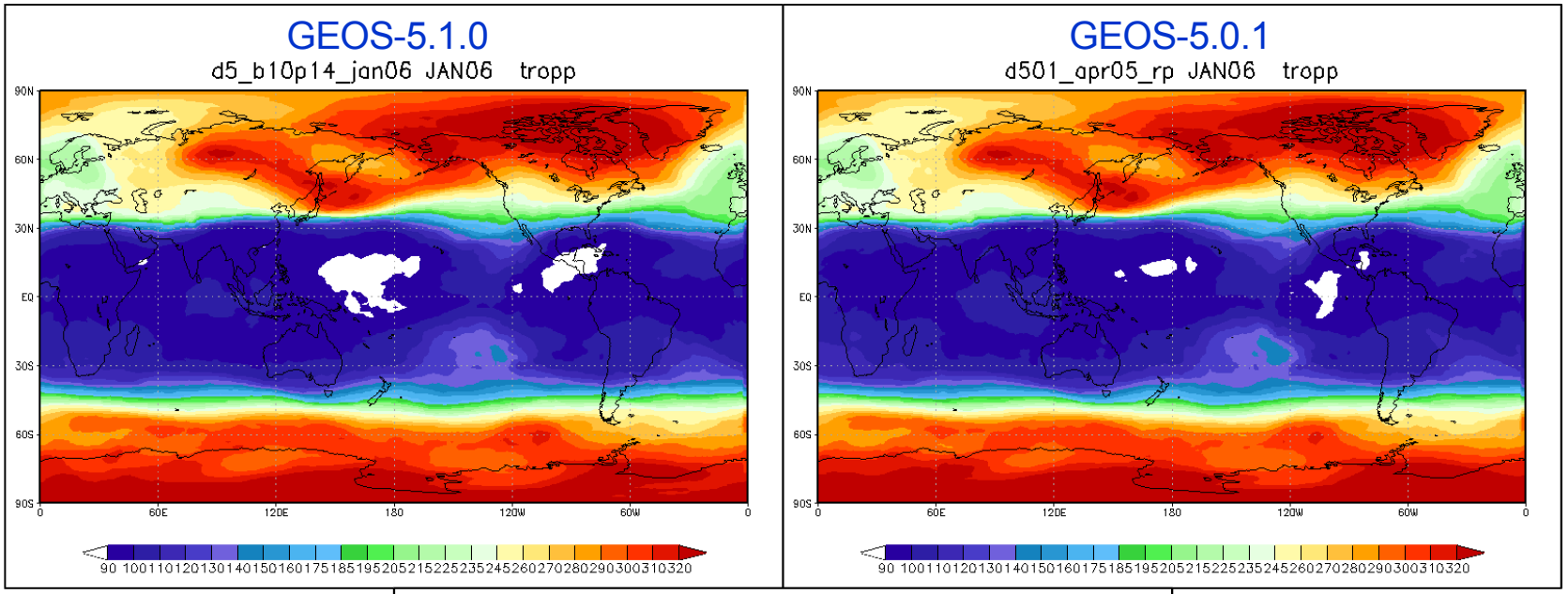

GDAS-CPC Zonal Temperature Time Series
Updated Through Julian Day = 272
2007
Zonal Mean [-90,-60]
PRESSURE (hPa)
0.4
1
2
5
10
30
50
70
100
150
200
250
300
400
500
700
1000
HEIGHT *km
50
45
40
35
30
25
20
15
10
5
0
J F M A M J J A S O N D J
-70 -65 -60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5 0 5 10
Degrees C

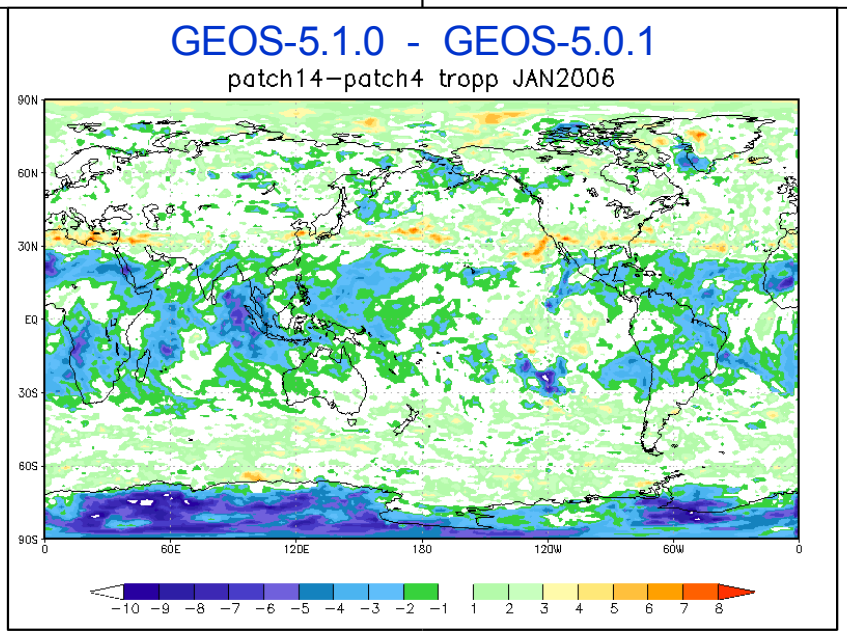

SBUV/2 TOTAL OZONE
Southern Hemisphere
90W
60W
120W
30W
150W
0
180
30E
150E
60E
120E
90E
NOAA-18
SBUV/2 OZONE
TOTAL
September 29, 2007
Analysis
No Data Beyond 80S
80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580


NCEP/GFS TOTAL OZONE
Southern Hemisphere
90W
60W
120W
30W
150W
0
180
30E
150E
60E
120E
90E
NCEP/GFS
TOTAL OZONE
September 30, 2007
00Z +f00
80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580

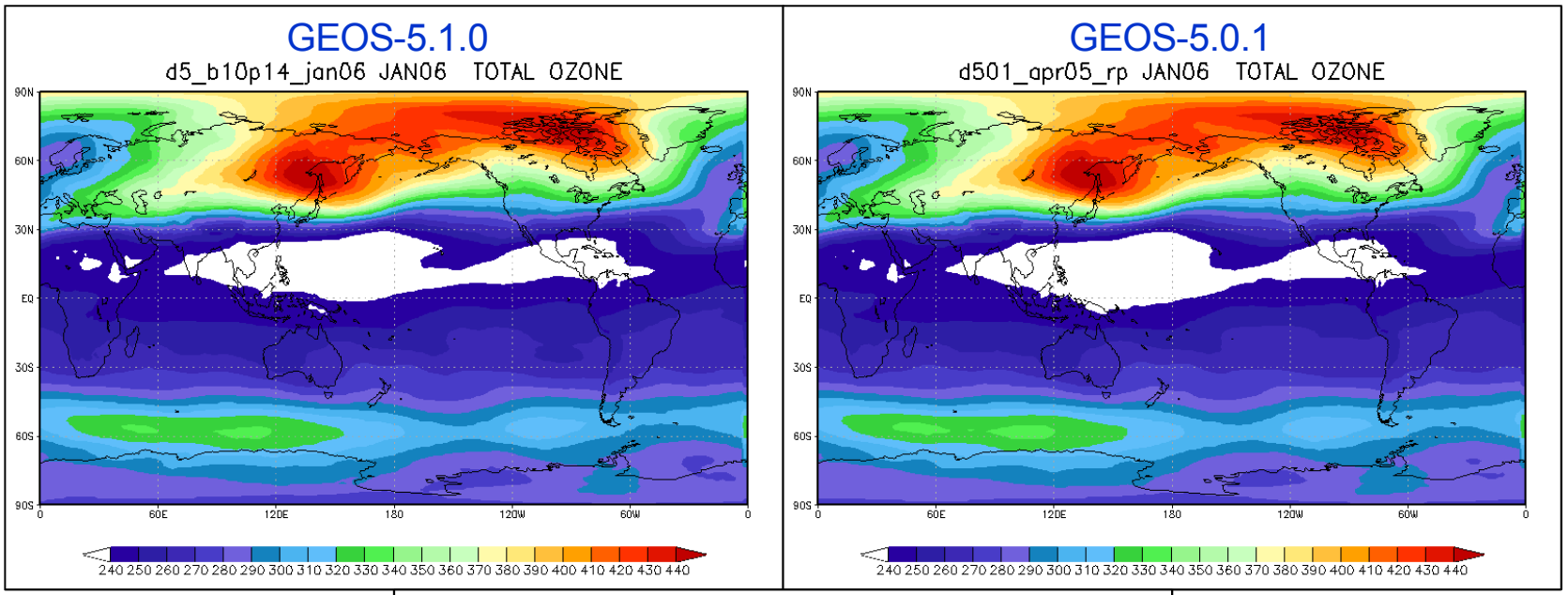
- Focus on GEOS-5.1.0 status and GEOS-5.0.1/GEOS-5.1.0 changes
- Summarize physical changes:
  - Correction of "pole problem" in dynamical core
  - Substantial changes to parameters in convection code
  - Other changes/bug fixes
- Also changes in filespec (format, fields provided)
- Example comparisons of changes

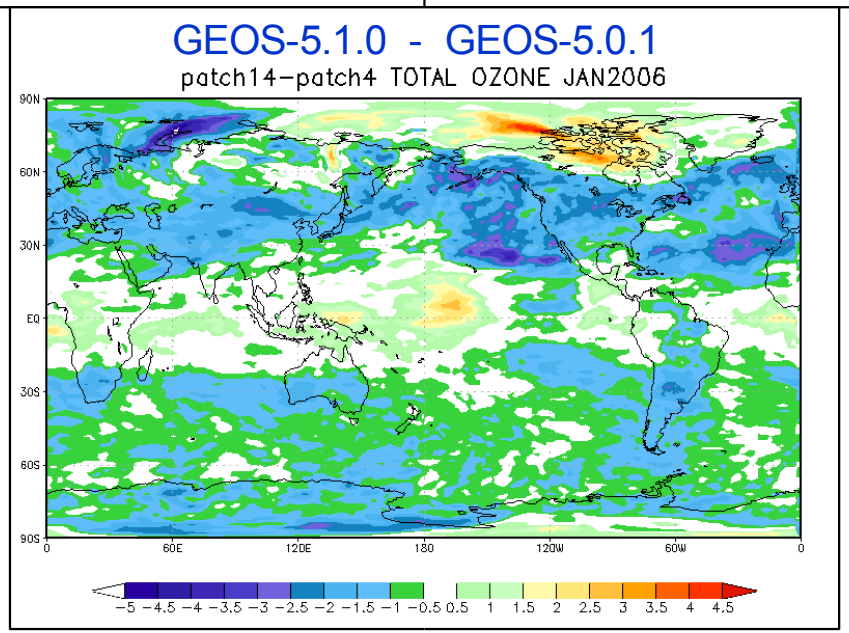
Tropopause Pressure [hPa]





Total Ozone [DU]



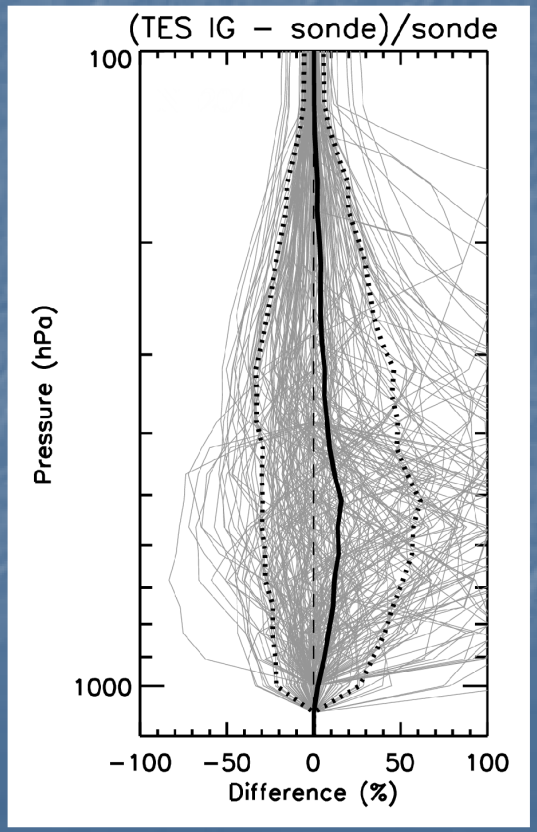


- Current data version (3) uses GEOS-5.0.1 data; plan to begin using GEOS-5.1.0 in forward stream in December 2007
- Temperature and H_2O profiles used for a priori; skin temperature and surface pressure also used in retrievals
- Version 4 (around spring 2008) will use GEOS-5.1.0
- Examples of GEOS-4/5.0.1 and GEOS-5.0.1/5.1.0 differences "in TES world", and comparisons with radiosondes
- Closer scientific relationship with GMAO critical to TES (e.g., assimilation of TES data, adjoint of GEOS-Chem, error estimates for GEOS-5 products)

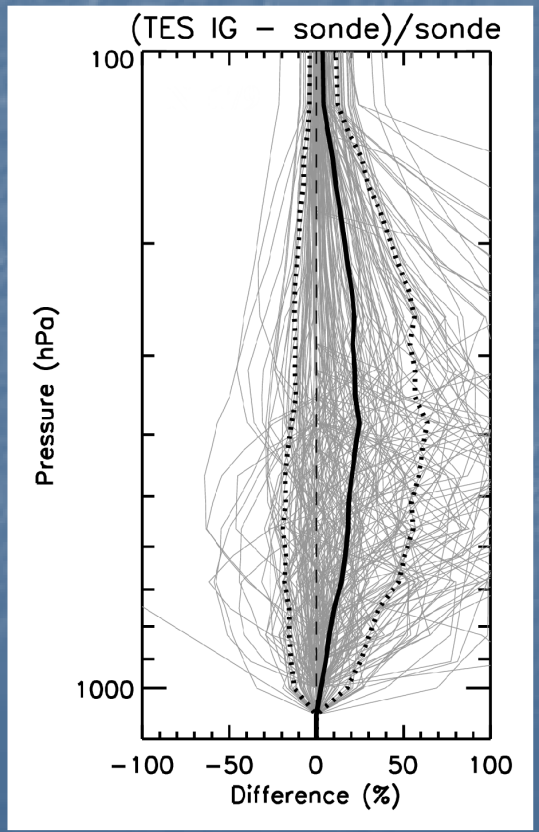
GMAO/Radiosonde Water Vapor Comparisons

M Shephard et al., Submitted JGR, 2007

GEOS-4



GEOS-5



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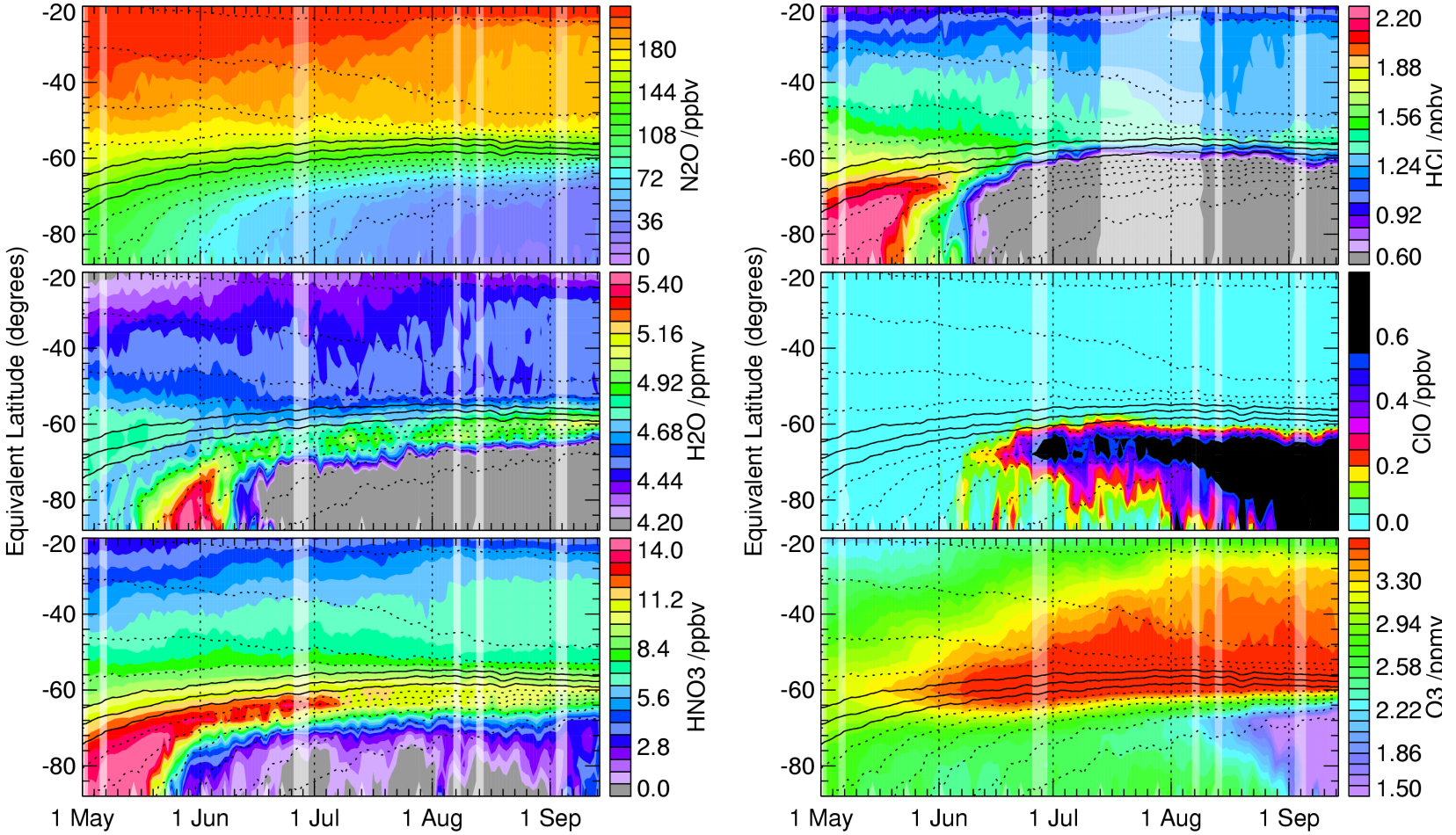
- Use GEOS-5.0.1 temperature in version 2.20/2.21 MLS retrievals
- Retrieval and other tests with GEOS-5.1.0 all satisfactory; ready to transition to using GEOS-5.1.0 (hopefully at same time as change to faster v2 processing software)
- Tentatively plan to reprocess entire dataset using GEOS-5.1.0 for consistency, but *after* current MLS v2 reprocessing is finished (projected spring 2008)
- Summarize use of meteorological datasets with MLS data in routine data inspection and atmospheric monitoring, and in research studies

Polar Winter Stratosphere – Antarctic Polar Processing



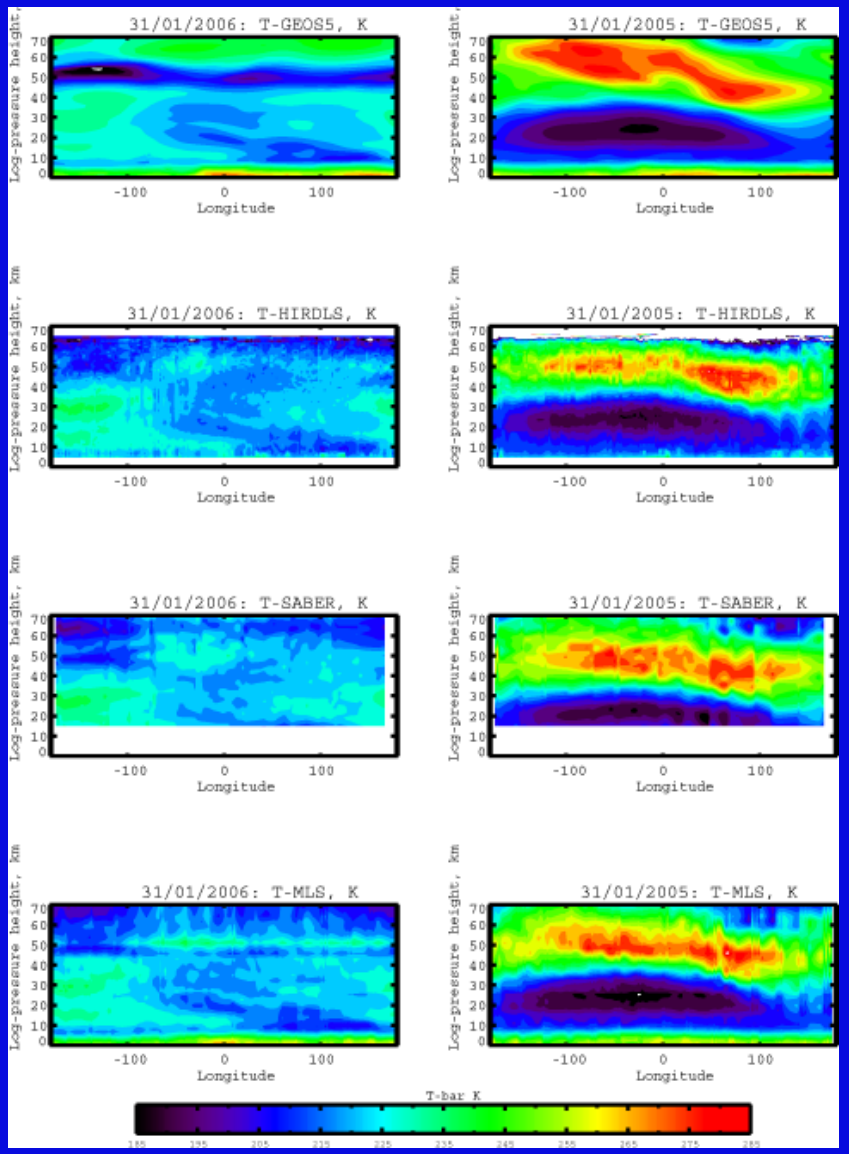
- Equivalent Latitude (EqL)/time plots at 520 K in LS, from 1 May through 11 Sep 2007 (190GHz ClO, N_2O used to avoid gap in MLS data, standard products show very similar results); GEOS-5 PV contours overlaid
- SH Vortex (strong gradients in PV contours, MLS trace gases) very large and strong (does not usually weaken/shrink until October)
- N_2O suggests descent until mid-August throughout vortex, then only in outer ring near edge
- Extensive denitrification/dehydration; HNO_3 vortex core increase suggests mixing between edge and core inside vortex
- High ClO, low HCl retreating slightly from vortex edge (typical this time of year)
- Chemical O_3 loss extensive, first apparent near vortex edge in July, then rapid and extending to vortex core after mid-August (expected to continue until about mid-October)

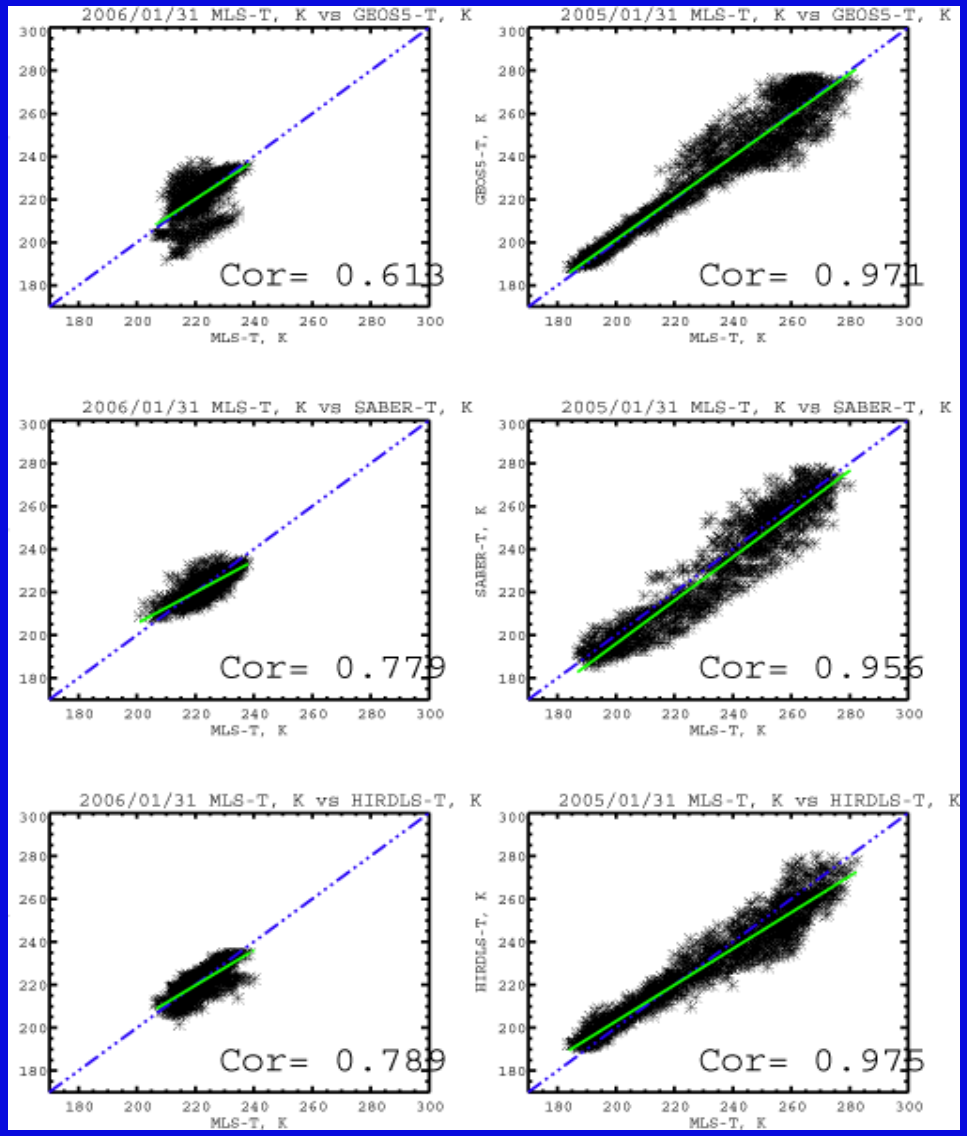
Instrument MP Summaries: HIRDLS (Kinnison)

- Show comparisons of GEOS-5.0.1 with HIRDLS, MLS and SABER in context of evaluation of wave dynamics in Arctic winters 2004/05 to 2006/07
- Evaluation of HIRDLS retrievals using GEOS-5.0.1 versus GEOS-5.1.0 shows small differences
- HIRDLS also plans reprocessing effort starting in spring 2008

Temperature (MLS-HIRDLS-SABER-GEOS5) at 70°-80° N and *10-60 km*, Jan 31 of 2006 and 2005

See Yudin, Gille, Khosravi, et al., Poster for details….





- GEOS-5.1.0 Discussion Issues:
  - Scheduling of GEOS-5.1.0 "retro-processing" for Aura period: concensus that two streams to begin in November and complete in late April 2008 will meet TES, HIRDLS, MLS team needs
  - Continuation of GEOS-5.0.1 through retro-processing: Not feasible without delay in retro-processing; GEOS-5.0.1 will overlap operational GEOS-5.1.0 (scheduled to begin next Monday, 8 October 2007) by approximately one month
  - Data volume issues: Advantages of high-resolution outweigh difficulties in handling data volumes
- Other Issues:
  - Need for information on uncertainties in GEOS-5 values: Action item for SP (and GM to remind him) to work with GMAO people to develop strawman webpage with such information
  - Very strong interest (MLS, HIRDLS teams within Aura, larger community as seen at SPARC DA workshop four weeks ago) in assimilation in upper stratosphere/mesosphere: Hope to establish/extend GMAO/Instrument Team/DA Community interactions in this area